

Essential Skills of the K-12 CTO

The job of overseeing a school district's technology program has grown exponentially in recent years as computers, the Internet, and other technology applications have become essential to the daily operation of schools.

What are the essential skills needed to oversee a school district's technology program? The Consortium for School Networking (CoSN) has undertaken a project to explore this question. Although actual job titles vary tremendously from one district to another (see *By Any Other Name* on p. 41), we will use Chief Technology Officer or "CTO" generically to refer to the main person or people responsible for technology leadership and decision making in a school system. We also refer to the school district as the main organization for which a K-12 CTO works, although technology leaders responsible for a network of independent or parochial schools—or even a large, individual school—are likely to identify with the issues.

Leadership and Vision

Developing a shared vision and big-picture perspective on a district's goals is crucial to planning for meaningful and effective uses of technology. Whether acting as a member of the executive cabinet or the leader of a technology team who reports to cabinet-level administrators, the CTO plays a key role in districtwide planning and goal setting. In this context, an effective CTO is one who is equally comfortable serving as a change agent and a consensus builder.

*By the CoSN
K-12 CTO Council*

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Technology leaders bring insight about ways in which the world is changing, the new tools that are available for teaching and learning, and the cutting-edge technologies that have yet to make their way out of R&D labs. An understanding of the technologically rich information society for which students must be prepared allows a CTO to serve as a change agent who helps fellow planners think beyond what is happening in schools today to what could or should be happening. What will students need to know and do in five years? What changes are required in how the schools operate to prepare students for their future?

At the same time, an effective CTO must work closely with a variety of constituents to develop consensus and buy-in. This means ensuring that communication is good between the techies and the non-techies and helping to empower stakeholders—both internal and external—to shape and embrace a collective vision for the role of technology within the district.

Although maintaining knowledge and expertise about high-tech issues is important, it is essential for the CTO never to succumb to technology for technology's sake. Instead, he or she must always keep in mind the key job of education—teaching and learning. In this way, the CTO needs to have a “leader as service provider” perspective, viewing information technology as a service business designed to support the district's strategic goals.

Equally important, a CTO must share with other district leaders a passion for equity and a belief that successful, technology-supported learning must take place for all students. Among other things, equity means providing school-based resources to

help address the lack of availability of interactive technology in the homes of disadvantaged students, ensuring that special needs students benefit from new technology implementations, and finding ways of distributing resources fairly among schools in the district.

Planning and Budgeting

In addition to helping develop a districtwide vision for technology's role, the CTO has primary responsibility for transforming that vision into a long-range plan. An effective framework for such planning begins with strategic challenges—things that the district must do to be successful—and then moves on to more specific goals, objectives, and action plans.

Converting strategic plans and staffing requirements into dollars and cents helps the CTO build the case for calculating the real costs of IT. This requires an understanding of Total Cost of Ownership (TCO) and the sorts of ongoing or recurring costs

that must be factored into budgeting for technology. It is essential for district planners to go beyond initial expenditures to determine the source of funds for ongoing support, equipment upgrades, and future system expansion—and to recognize that technology planning is a dynamic process that needs frequent revisiting and rethinking.

Team Building and Staffing

A staffing strategy to support a district's technology plan cannot be developed as an afterthought; it should be an integral part of strategic planning from the very beginning. One technique for determining whether there is a good match between current personnel and future needs is to build and compare two organization charts.

For starters, create an organization chart with necessary functions (e.g., data management, systems processing, acceptance testing), including any new functions that have been identified through strategic planning.

By Any Other Name

There is a great deal of variety when it comes to the job titles used by districts to refer to their highest-level technology leaders. In many cases, the differences are simply a matter of semantics or historical chance, although some variables do reflect the different roles technology leaders play from community to community.

Some district technology leaders hold cabinet-level positions, reporting directly to the superintendent of schools. The title attached to such a position might be Chief Information Officer, Associate Superintendent for Technology, or Chief Technology Officer.

More frequently, the top technology leader is a Director or Executive Director of an area such as Educational Technology or Technology Services, reporting to a cabinet-level administrator such as an Associate Superintendent, Chief Operating Officer, or Chief Financial Officer.

Sometimes, technology leadership for a district is shared by two people with parallel roles and titles—one in charge of instructional technology and another (with a title such as Director of Information Technology) who oversees technology infrastructure and management applications.

Comparing this to a current org chart listing today's staffing and roles will help you identify gaps where functions are now being neglected or excessive head counts where services are no longer needed.

Great teams require great leadership—including the ability to lead by example. The CTO has to be a team player who is willing to share credit for successful projects. All members of the technology team should be given project management roles, and the groups closest to the point of technology implementation need to be given true ownership of decisions about the technology that most closely affects them.

Systems Management

The majority of a CTO's time, especially in smaller districts, can be spent overseeing the day-to-day operation of the district's IT systems. All of the project management and personal leadership skills described earlier come into play in the effective running of this large-scale enterprise, as does the need to be a perpetual learner.

With the organization looking to the CTO for leadership on purchasing decisions, software standards, system reliability, infrastructure, network security, upgrades, maintenance, and support for the entire enterprise, it is necessary to keep up with a wide array of frequently changing technologies. CTOs need to read constantly, subscribe to e-mail lists and discussion groups, and be vigilant about watching the horizon for technology breakthroughs and trends. This means being astute observers of environments beyond K–12 education,

including colleges, universities, and business, where the first implementations of powerful new technologies often occur.

Equally important, the CTO must recognize that it is impossible to be an expert on every aspect of technology. Building a great team, knowing when to delegate responsibility, and understanding how to oversee the work of team members without decreasing their sense of ownership are all just as important as developing personal expertise.

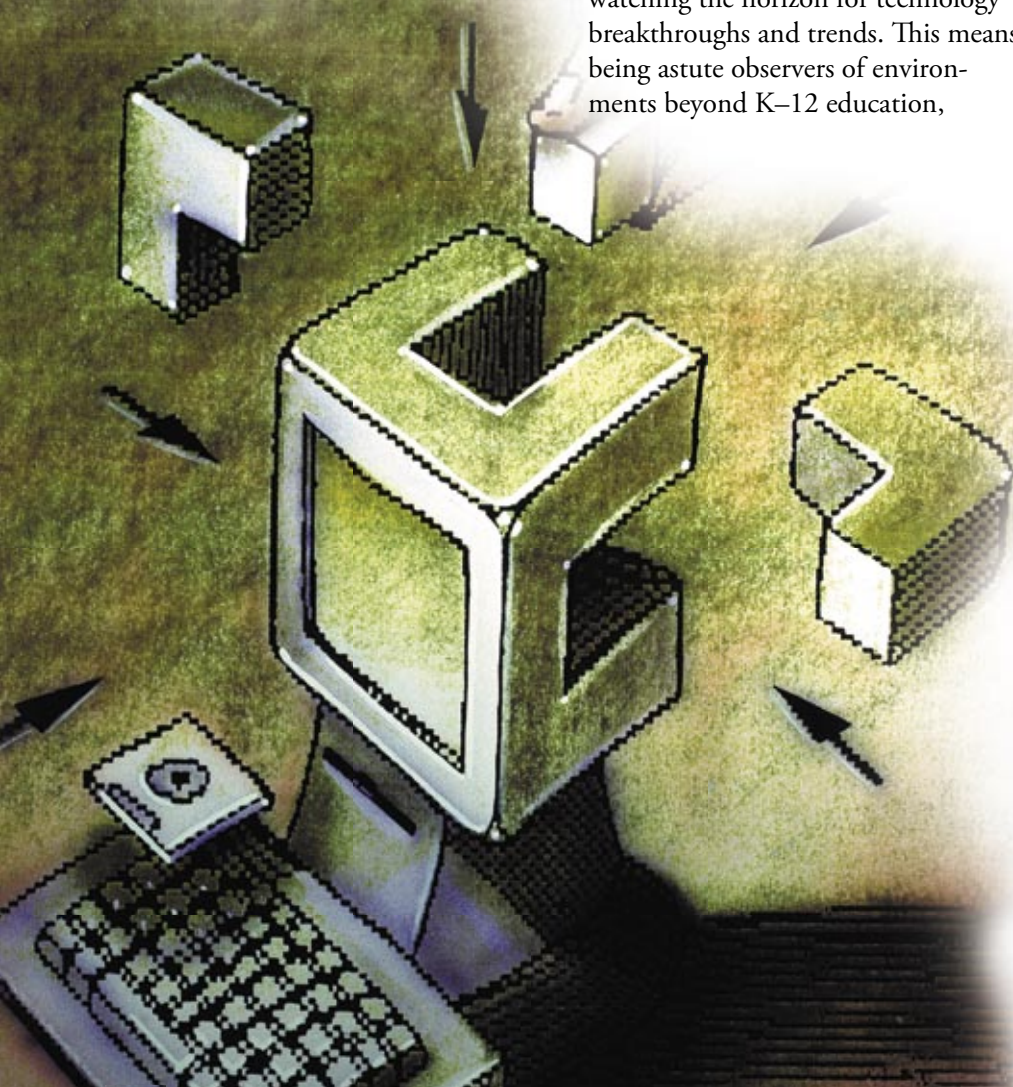
Making sure that the various technology systems employed by a district are standardized and compatible with one another is one of the most challenging parts of a CTO's job. Also important is vigilance about security issues and an understanding of the tools and techniques needed to prevent the spread of viruses, intrusion by hackers, or other breaches of network security.

A commitment to the true business of education can lead to a challenging balancing act. As tempting as it might be to just say no, the CTO's job is to figure out ways to support and integrate the best uses of technology for teaching and learning while minimizing potential risks. Although this will sometimes entail asking constituents to give up a favorite tool to transition to one that is more stable or easily integrated, the overall goal must be to make life easier for the instructional community, not for the technology support staff.

In the end, it falls to the CTO to ensure the smooth operation of the entire IT system, with opportunities for growth and minimal downtime. We must be committed to making sure that the technology is there and working when it is needed.

Information Management

The fact that a growing number of districts use the title chief information officer to refer to their highest-



level technology leader is a reflection of the crucial role information plays in today's schools. The accountability movement and the powerful data-gathering abilities of digital-age tools have combined to produce an information culture in which data management is key to strategic planning.

On the instructional end, the CTO needs to be knowledgeable about the data-driven decision making and be able to locate, customize, or create applications that make it easy for district educators to:

- Assess student progress, frequently and painlessly
- Generate comprehensive baseline data for each student, class, and grade level, for both performance and content standards
- Analyze data so that it is easy to identify each student's academic strengths and weaknesses
- Monitor gains in student proficiency on a continuous basis

- Plan new interventions for individual students, groups of students, classes, and/or grade levels using relevant, up-to-date information
- Provide for ongoing review and evaluation of all school improvement efforts and intervention strategies
- Show per-pupil expenditures linked with measures of progress

Data management has long been part of the administrative side of the equation—with extensive databases used for student records, scheduling, managing budgets, and keeping track of human resource issues. As data mining becomes an increasingly integral part of the instructional planning process, the CTO must lead the way in creating compatible systems that integrate and allow links to be made between the instructional and

the administrative data. In such an integrated system, access needs to be real-time, with data elements and structures shared by all applications.

Serving as an effective information officer involves not only technical challenges but also human ones. In many districts, every department has developed its own systems, applications and business practices tailored to departmental needs. The CTO



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must be able to take a wide-angle view of all of the data needs of the organization as a whole—and then apply interpersonal skills to helping all stakeholders understand how they will benefit by migrating to a new, integrated data management system.

Business Leadership

Typically, the CTO advises the superintendent or CFO on technology expenditures. The CTO oversees the selection of technology items, reviews requisitions for their purchase, and exercises authority to approve, amend, or reject purchases based on compatibility with district goals and needs.

In making such purchasing decisions, the CTO must ensure that the district is getting its money's worth. With declining budgets, it is particularly necessary for today's CTO to be a great fiscal manager, establishing metrics to be used as efficiency guides and help determine return on investment.

Along these same lines, it is important for the CTO to cast a critical eye on potential technology expenditures to determine if they are really needed. This means playing devil's advocate and pushing others on the technology planning team to justify the value of new and expensive purchases—in other words, to answer the question "Couldn't we do it just as well, and less expensively, without this technology?"

When convinced that a particular technology use really is key to a district's strategic goals, the CTO is often called upon to don another business hat—that of public relations officer for technology endeavors. In this role, the CTO is responsible for articulating, to both internal and external stakeholders, a systemic vision for where the district is headed. Communicating regularly with community leaders and participating in local business organizations keeps visibility for school technology programs high and helps build support that will

stand the district in good stead when it comes to bond referendums and other initiatives requiring community support.

In addition, building effective partnerships with businesses, universities, or associations that can offer financial and intellectual support is a key role for the CTO. Similarly, it is important to develop close working relationships with technology vendors—including information exchanges, pilot projects, and other win-win arrangements.

Education and Training

Professional development is a crucial, often underfunded, aspect of a district's technology program. The CTO has the responsibility to oversee districtwide, technology-related staff development efforts—from ensuring a sufficient budget through the implementation and assessment process. Successful coordination in this area involves an awareness of the latest thinking about effective professional development.

Though the top priority of technology-related professional development should be to help teachers maximize their effectiveness, staff development efforts can not stop there. Technology competencies should be identified for all employee groups and the opportunities to improve these necessary skills should be widely available. Participants should be involved in the needs assessment process, as should department leaders.

Ethics and Policies

An effective CTO understands the social, legal, and ethical issues related to technology and models responsible decision making with regard to these areas. For starters, the CTO oversees the creation, revision, and enforcement of the district's Acceptable Use Policy (AUP). This involves building consensus around key issues related to appropriate uses of the Internet

and e-mail, as well as communication with all parties about what is expected of them.

Though many districts believe that education and enforcement of the AUP are the most important ways of keeping students away from inappropriate digital content, technology-based filters and controls are increasingly a part of the school technology scene. Legal mandates for filtering, as well as increasingly aggressive tactics by groups promoting inappropriate content, all contribute to the need for technology-based protection. Being thorough about selecting and monitoring such tools is an important part of a CTO's job.

It is also essential to be knowledgeable and vigilant about a variety of other issues related to technology use. The CTO must participate in the development of policies that clearly enforce privacy, confidentiality, and copyright law as well as assign ownership of the district's intellectual property. All of these issues need to be explored as they relate to multimedia projects, district Web sites, e-mail correspondence, peer-to-peer sharing, and other uses of emerging technologies. Finally, the CTO needs to be involved in setting policy and standards involving such things as environmentally safe and healthy practices in the use of technology.

To ensure the success of such endeavors, the CTO must work closely with a variety of departments. Although the technology division may be authorized to create and publicize standards, enforcement is likely to be the responsibility of campus and department leaders. It is, therefore, essential to collaborate effectively at every step—from planning through follow-up.

Communication Systems

Communicating with all members of the educational community is key to any school or district leader's role.

The CTO has the chance—and the responsibility—to hone the tools with which these sorts of information exchanges happen. In fact, technology-enhanced communication with stakeholders, including students, staff, and community members, provides one of the most tangible methods of demonstrating the value of technology resources.

Leveraging the expanding number of community members who have access to the Internet, the CTO should ensure that school Web sites provide curriculum resources, such as online databases, to students. At the same time, Web and e-mail communications should offer information to parents regarding school events and student grades, performance, and attendance. The CTO needs to work closely with curriculum leaders and principals to ensure that teachers have the necessary training to provide and regularly update this information.

Even the humble telephone comes increasingly under the purview of the CTO. Automated out-calling systems play an important role in notifying parents of important events or student absences, voice mail boxes for staff members further communications with families who do not have e-mail access, and voice-based homework help lines can be used from home by students who need assistance. With analysts expecting voice and data networks to become increasingly integrated into seamless communications systems, leaders will find themselves with ever-more-powerful ways of supporting the exchange of information.

Ultimately, the CTO is responsible for ensuring that technology-supported communications methods are reliable and available at all times, through the purchase of appropriate hardware, applications, and support. The CTO must also provide

guidelines for the use of each of these communication resources and should work collaboratively with other departments to ensure effective implementation of these same resources in daily operations.

In summary, the K–12 CTO must be a skilled administrator, a knowledgeable educator, an effective communicator, and a technologically savvy individual who can work with all district staff at all levels within the organization.



This is an excerpt from the first in a series of papers that make up the 2004 CoSN Compendium, a collection of resources for members of the Consortium for School Networking (<http://www.cosn.org>), a national nonprofit organization that promotes the use of information technologies in K–12 education to improve learning. Contributors include Sheryl Abshire, Charlie Garten, Jim Hirsch, Katie Lovett, Bailey Mitchell, Bob Moore, Robert Nelson, John Porter, Dave Richards, Charles Thompson, and Ed Zaiontz (CTO Council chair).

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